Diode Array

Six Matched Diodes on a Common Substrate
Monolithic Silicon

CA3039

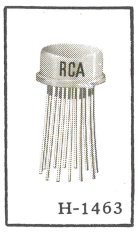
The RCA-CA3039 consists of six ultra-fast, low capacitance diodes on a common monolithic substrate. Integrated circuit construction assures excellent static and dynamic matching of the diodes, making the array extremely useful for a wide variety of applications in communication and switching systems.

Five of the diodes are independently accessible, the sixth shares a common terminal with the substrate.

For applications such as balanced modulators or ring modulators where capacitive balance is important, the substrate should be returned to a DC potential which is significantly more negative (with respect to the active diodes) than the peak signal applied.

ULTRA-FAST LOW-CAPACITANCE MATCHED DIODES

For Applications in Communications and Switching Systems



12-Lead TO-5

APPLICATIONS

- Balanced modulators or demodulators
- Ring modulators
- High speed diode gates
- Analog switches

FEATURES

- Excellent reverse recovery time – 1 ns typ.
- Matched monolithic construction – V_F matched within 5 mV
- Low diode capacitance – C_D = 0.65 pF typical at V_R = – 2 V

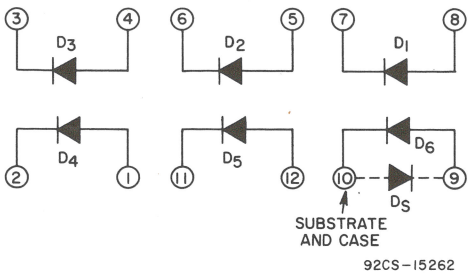
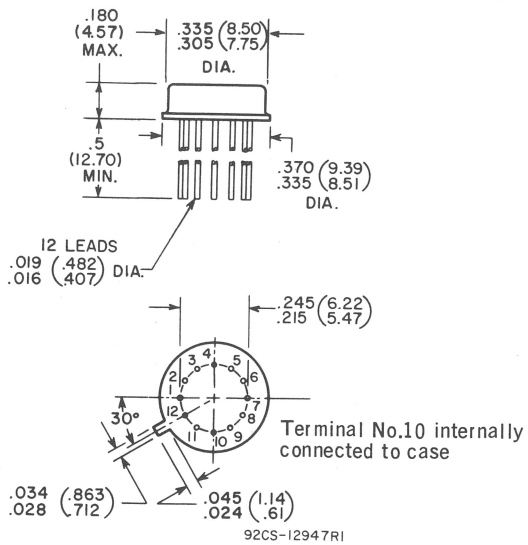


Fig. 1 - Schematic Diagram for CA3039

DIMENSIONAL OUTLINE

Dimensions In Inches and Millimeters



Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated.

Information furnished by RCA is believed to be accurate and reliable. However, no responsibility is assumed by RCA for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of RCA.

ABSOLUTE MAXIMUM RATINGS at T_A = 25 °C

Dissipation:

Any one diode unit	100	mW
Total for device	600	mW
For T_A > 55 °C	derate linearly 5.7	mW/°C

Temperature Range:

Operating	-55 to +125 °C
Storage	-65 to +200 °C

Peak Inverse Voltage, PIV for: D_1-D_5	5 V
D_6	0.5 V
Peak Diode-to-Substrate Voltage, V_{DI} for D_1-D_5 (term. 1,4,5,8 or 12 to term. 10)	+20, -1 V
DC Forward Current, I_F	25 mA
Peak Recurrent Forward Current, I_f	100 mA
Peak Forward Surge Current, I_f (surge)	100 mA

ELECTRICAL CHARACTERISTICS, at T_A = 25° C

Characteristics apply for each diode unit, unless otherwise specified.

CHARACTERISTICS	SYMBOLS	SPECIAL TEST CONDITIONS	LIMITS MIN.	LIMITS TYP.	LIMITS MAX.	UNITS	CHARACTERISTIC CURVES FIG.
DC Forward Voltage Drop	V_F	I_F = 50 μA	–	0.65	0.69	V	2
		1 mA	–	0.73	0.78	V	
		3 mA	–	0.76	0.80	V	
		10 mA	–	0.81	0.90	V	
DC Reverse Breakdown Voltage	$V_{(BR)R}$	I_R = -10 μA	5	7	–	V	–
DC Reverse Breakdown Voltage Between any Diode Unit and Substrate	$V_{(BR)R}$	I_R = -10 μA	20	–	–	V	–
DC Reverse (Leakage) Current	I_R	V_R = -4 V	–	0.016	100	nA	3
DC Reverse (Leakage) Current Between any Diode Unit and Substrate	I_R	V_R = -10 V	–	0.022	100	nA	4
Magnitude of Diode Offset Voltage (Difference in DC Forward Voltage Drops of any Two Diode Units)	$\lvert V_{F_1} - V_{F_2} \rvert$	I_F = 1 mA	–	0.5	5	mV	2
Temperature Coefficient of $\lvert V_{F_1} - V_{F_2} \rvert$	$\frac{\Delta \lvert V_{F_1} - V_{F_2} \rvert}{\Delta T}$	I_F = 1 mA	–	1	–	μV/°C	5
Temperature Coefficient of Forward Drop	$\frac{\Delta V_F}{\Delta T}$	I_F = 1 mA	–	-1.9	–	mV/°C	6
DC Forward Voltage Drop for Anode-to-Substrate Diode (D_S)	V_F	I_F = 1 mA	–	0.65	–	V	–
Reverse Recovery Time	t_{rr}	I_F = 10 mA, I_R = 10 mA	–	1	–	ns	–
Diode Resistance	R_D	f = 1 kHz, I_F = 1 mA	25	30	45	Ω	7
Diode Capacitance	C_D	V_R = -2 V, I_F = 0	–	0.65	–	pF	8
Diode-to-Substrate Capacitance	C_{DI}	V_{DI} = +4 V, I_F = 0	–	3.2	–	pF	9

TYPICAL CHARACTERISTICS

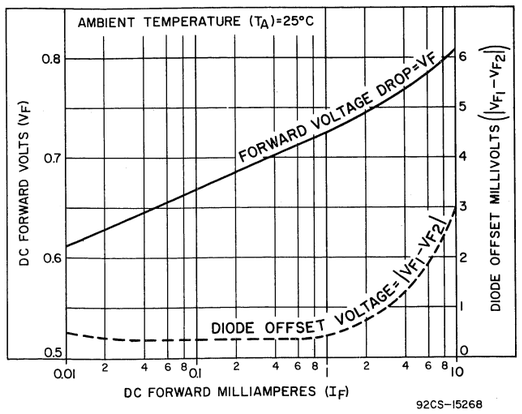


Fig. 2 - DC forward voltage drop (any diode) and diode offset voltage vs DC forward current

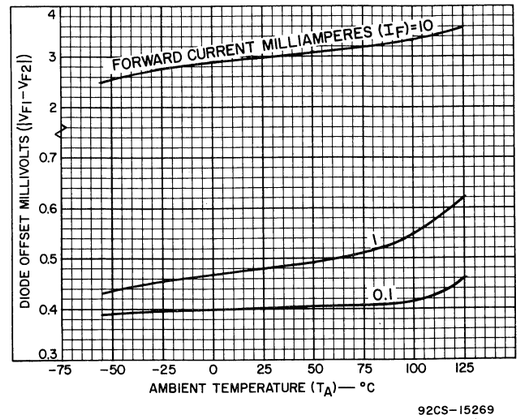


Fig. 5 - Diode offset voltage (any diode) vs temperature

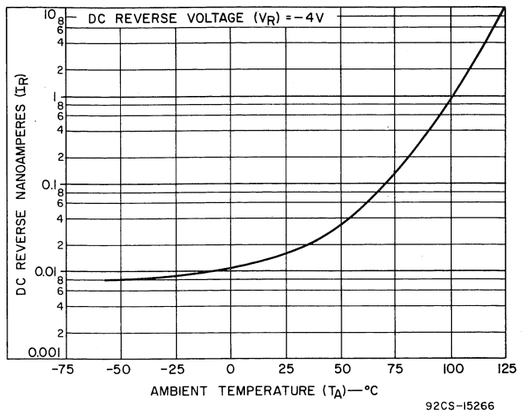


Fig. 3 - DC reverse (leakage) current (diodes 1,2,3,4,5) vs temperature

Fig. 4 - DC reverse (leakage) current between diodes (1,2,3,4,5) and substrate vs temperature

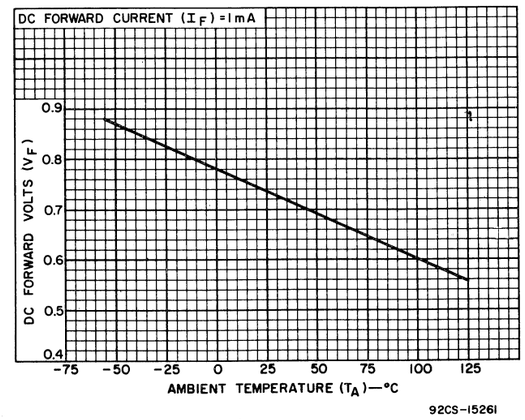


Fig. 6 - DC forward voltage drop (any diode) vs temperature

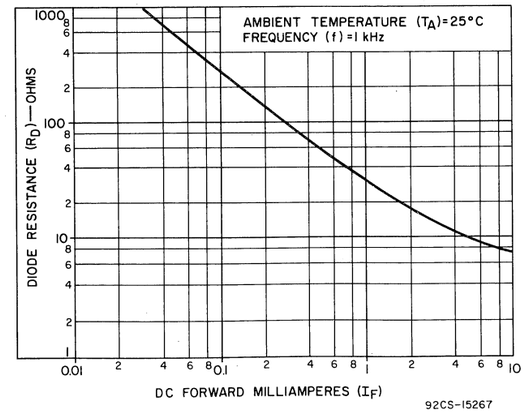


Fig. 7 - Diode resistance (any diode) vs DC forward current

TYPICAL CHARACTERISTICS

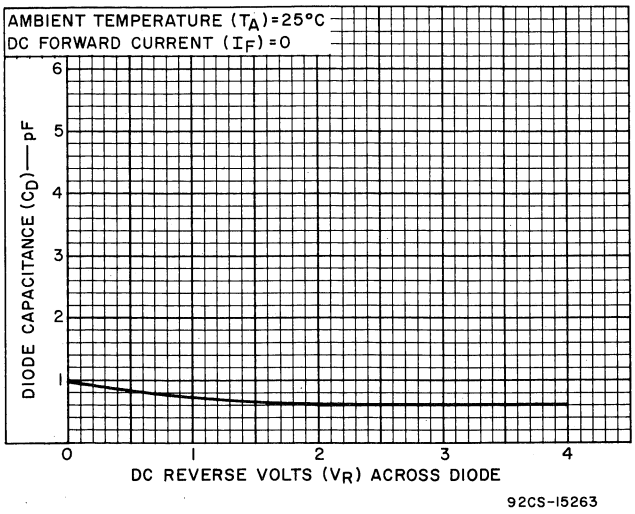


Fig. 8 - Diode capacitance (diodes 1,2,3,4,5) vs reverse voltage

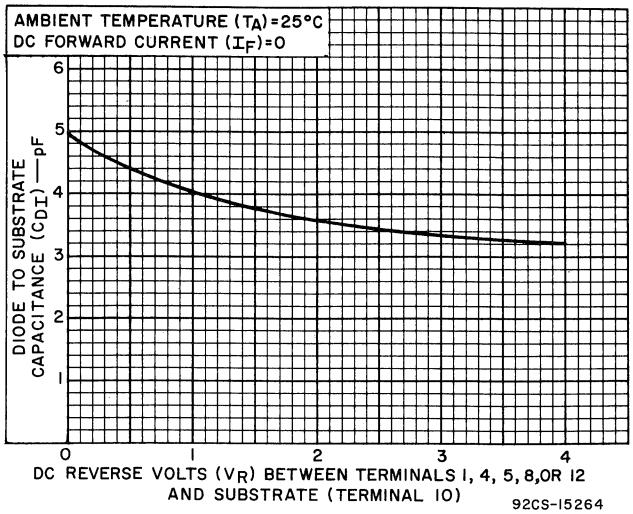


Fig. 9 - Diode-to-substrate capacitance vs reverse voltage